

REPLACED BY  
ART 34 ANDT

13. A substrate according to claim 12 when dependent on claim 11 wherein the active area on the other side of the substrate is a cathode.
14. A substrate according to any one of claims 1 to 13 wherein there is provided a plurality of semiconductor devices and a plurality of conductive vias for connecting an active area of semiconductor devices on one surface of the substrate to another surface of the substrate.  
5
15. A substrate according to claim 14 wherein the plurality of semiconductor devices are formed as an array.
16. A substrate according to claim 14 or claim 15 wherein there is provided a conductive via for each semiconductor device.  
10
17. A substrate according to any one of claims 14 to 16 wherein the active areas of each semiconductor device are provided on the same side of the substrate.
18. A substrate according to any one of claims 1 to 17 wherein the semiconductor device is a photodiode.  
15
19. A substrate according to claim 18 wherein the semiconductor device is a photodiode of a medical imaging system.
20. A substrate according to claim 19 wherein the medical imaging system is a computed tomography system.
21. A photo-detector array including a plurality of sub-arrays of photo-detectors, the photo-detectors of each sub-array being formed on a substrate with an active area of each photo-detector being formed on a surface of the substrate, there further being formed for each photo-detector a conductive via through the substrate from an upper surface thereof to a lower surface thereof to connect the active area of each photo-detector to the lower surface of the substrate, wherein a plurality of said sub-arrays of photo-detectors are placed adjacent to each other in a matrix to form the photo-detector array.  
20
22. A photo-detector according to claim 21 wherein the matrix extends in two directions.  
25
23. An imaging system comprising: a radiation detector including a photo detector array according to claim 21 or claim 22, a radiation source facing the radiation  
30

REPLACED BY  
ST 34 AND 35

detector, and means for controlling the radiation detector and the radiation source.

24. An imaging system according to claim 23 wherein the radiation source is an X-ray tube equipped with a high-voltage generator.

5 25. An imaging system according to claim 23 or claim 24 wherein the radiation detector and the radiation source are radially mounted in a cylindrical scanning structure.

26. An imaging system according to any one of claims 23 to 25 wherein the means for controlling comprises a computer system.

10 27. A method of manufacturing a semiconductor device comprising: providing an active area of the semiconductor device on one surface of a substrate; forming a conductive via through the semiconductor device from the one surface of the substrate to another surface of the substrate; and connecting the active area to the conductive via such that the active area is connected to the other surface of the substrate.

15 28. A method according to claim 27 further comprising the step of electrically isolating the conductive via from the substrate.

29. A method according to claim 27 or claim 28 wherein the conductive via comprises polysilicon.

20 30. A method according to claim 29 further comprising the step of forming polysilicon on the inner walls of the via.

31. A method according to claim 30 further comprising the step of providing a further conductive element from one side of the substrate to the other within the conductive via.

25 32. A method according to claim 30 further comprising the step of providing a filling material within the conductive via.

33. A method according to any one of claims 27 to 32 further comprising the step of providing a further conductive element connected between the active area of the device and the conductive via.

ART 34 AND 35

34. A method according to any one of claims 27 to 33 further comprising the step of providing a further conductive element on the other side of the substrate connected to the conductive via.
35. A method according to claim 33 wherein the further conductive element is a contact pad.
36. A method according to claim 34 or claim 35 wherein the further conductive element on the other side of the substrate is provided for making an off-chip connection to the conductive via.
37. A method according to any one of claims 27 to 36 wherein the semiconductor device is a photodiode.
38. A method according to claim 37 wherein the active area on the one surface of the device is an anode.
39. A method according to any one of claims 27 to 38 further comprising the step of providing a further active area on the other side of the substrate.
40. A method according to claim 39 when dependent on claim 38 wherein the active area on the other side of the substrate is a cathode.
41. A method according to any one of claims 27 to 40 further comprising the step of providing a plurality of semiconductor devices and a plurality of conductive vias for connecting an active area of semiconductor devices on one surface of the substrate to another surface of the substrate.
42. A method according to claim 41 wherein the plurality of semiconductor devices are formed as an array.
43. A method according to claim 41 or claim 42 wherein there is formed a conductive via for each semiconductor device.
44. A method according to any one of claims 41 to 43 wherein the active areas of each semiconductor device are formed on the same side of the substrate.
45. A substrate according to any one of claims 27 to 44 wherein the semiconductor device is a photodiode.
46. A method according to claim 45 wherein the semiconductor device is a photodiode of a medical imaging system.

REPLACEMENT  
ART 3A AMENDMENT

47. A method according to claim 46 wherein the medical imaging system is a computed tomography system.
48. A method as substantially described herein with reference to, or as shown in, any one of Figures 2 to 18.
- 5 49. A semiconductor device or substrate substantially as described herein with reference to, or as shown in, any one of Figures 2 to 18.
50. A medical imaging system substantially as described herein with reference to or as shown in any one of Figures 2 to 18.
51. A method as substantially described herein.
- 10 52. A semiconductor device or substrate substantially as described herein.
53. A medical imaging system substantially as described herein.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/FI 03/00575

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H01L31/101 H01L31/0352 H01L23/48

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 54554 A (HILSUM CYRIL ;SECR DEFENCE (GB); WATTON REX (GB)) 3 December 1998 (1998-12-03)  page 3, line 21 - line 29 column 7, line 25 -column 12, line 31; figures 1,2	1-4, 14-17, 27-30, 41-44
Y	---	5,6,31, 32
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 14, 22 December 1999 (1999-12-22) & JP 11 261086 A (SHARP CORP), 24 September 1999 (1999-09-24) abstract --- -/-	1,27

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

### ° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the International filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

1 October 2003

23.10.2003

Name and mailing address of the ISA  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl  
Fax: (+31-70) 340-3016

Authorized officer

FREDRIK WAHLIN/MN

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/FI 03/00575

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 599 744 A (MCCAUSLAND CONNIE S ET AL) 4 February 1997 (1997-02-04) column 1, line 18 -column 2, line 32 column 3, line 60 -column 4, line 56 column 7, line 13 - line 40; figure 1 ---	5,6,31, 32
A	US 6 173 031 B1 (KOTIAN FRANCOIS ET AL) 9 January 2001 (2001-01-09) column 1, line 60 -column 2, line 35 column 3, line 37 -column 4, line 27; figures 3,4 ---	1-53
A	US 6 396 898 B1 (SAITO YASUO ET AL) 28 May 2002 (2002-05-28) column 2, line 19 - line 38 -----	1-53

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/FI 03/00575

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
WO 9854554	A	03-12-1998	AU	732258 B2		12-04-2001
			AU	7439898 A		30-12-1998
			EP	0985137 A1		15-03-2000
			WO	9854554 A1		03-12-1998
			JP	2002500763 T		08-01-2002
			US	6388256 B1		14-05-2002
JP 11261086	A	24-09-1999		NONE		
US 5599744	A	04-02-1997	CA	2211913 A1		03-10-1996
			EP	0815591 A2		07-01-1998
			FI	973239 A		06-08-1997
			JP	11500867 T		19-01-1999
			WO	9630932 A2		03-10-1996
			US	5717247 A		10-02-1998
US 6173031	B1	09-01-2001	DE	19839786 A1		27-05-1999
			JP	11221207 A		17-08-1999
US 6396898	B1	28-05-2002	JP	2001242253 A		07-09-2001
			US	2002110216 A1		15-08-2002